# Issues on Determination of Accurate Fajr and Dhuha Prayer Times According to Fiqh and Astronomical Perspectives in Malaysia: A Bibliography Study

AW. Raihana, K. Norihan., M. Muhamad Hazwan[1]

***Abstract***— The determination of accurate times for Fajr and Dhuha prayers in Malaysia is faced with issues of differing views in the fixation of the parameters of the sun's altitude used in the calculation of astronomy, especially in Malaysia. Therefore, this study aims to identify issues and problems in the methods used in determining the accurate times for both these prayers through a literature review of previous research studies. The results show the need to review the parameters of sun altitude used in calculating prayer times for both these prayers through observations in changes in the brightness of the early morning light for distinguish of true dawn and false dawn for the Fajr prayers and the length of the shadow for Dhuha payer by collecting data from all the states throughout Malaysia.

***Keywords***— *fajr*, *dhuha*, sky brightness, length of shadows, astronomy, Islamic jurisprudence.

## I. INTRODUCTION

The determining of accurate prayer times is an important aspect in the life of a Muslim as it is one of the prerequisites for his prayers to be accepted apart from the aspect of accurately facing the qiblah. The determining of accurate times for the Dhuhr prayer, 'Asr and Maghrib prayers do not demonstrate any difficulties because these matter has been verified clearly with *nas* and the measurement parameters used are more easily determined because the movement of the sun could be measured by the length of the shadows that are clearly visible. However, there are some difficulties in determining the accurate prayer times for Fajr and Isha'a prayers because the sun is below the horizon and thus, the measurement of shadows cannot be performed. However, determining the accurate time for Isha'a prayers is not difficult because interpretations can be made of the red light which can still be measured by employing the height of the sun below the horizon parameter which an be determined through astronomical observations and calculations. However, it is difficult to determine the accurate time of the Fajr prayer because of complexities in determining the height of the sun below the horizon parameters which is used to distinguish the two dawns that is false dawn (*fajr kādhib*) and true dawn (*fajr sadiq*) as prescribed in the form of a general *nas*. Arising out of this difficulty, the issue of determining the beginning of the Fajr prayer remains a debate among scholars and astronomers, especially in Malaysia due to the different altitude of the sun below the horizon parameters. 19° is used in Kelantan whereas 20° is used in other states in Malaysia. Although the difference is only 1°, this 1° is equivalent to 4 minutes thus making the big time difference. This issue becomes more crucial as the accurate Fajr prayer time involves two important rituals in the lives of Muslims; the prayer and fasting obligations. On the other hand, the problem in determining the accurate Dhuha prayer time is due to the general explanation in the hadith of the Prophet s.a.w. that only states a spear's length. This has given rise to different points of view to be determined in astronomical calculations. In Malaysia, the determination of accurate Dhuha prayer time has been resolved by the Department of Islamic Development Malaysia (JAKIM) in 2001. On average, the set accurate time for Dhuha is 28 minutes after the *syuruq* time means by the time sunrise. However, this time value is still not precise in its use as the 28 minute span is an estimation that could be rounded to be more than or less than 28 minutes.

## II. METHODOLOGY OF THE RESEARCH

This study is a library research which aims at collecting data to identify issues and problems in determining the accurate times for the Fajr and Dhuha prayers in Malaysia from previous studies through the study of journal articles and working papers of conferences. Data collected is analysed using the content analysis method which is a deductive approach to identify issues and problems that occur in determining accurate times for the dawn Fajr and forenoon Dhuha prayer times.

## III. THEORETICAL FRAMEWORK IN DETERMINING ACCURATE FAJR PRAYER TIMES FROM FIQH AND ASTRONOMY PERSPECTIVES

[1] A. W. Raihana is Senior Lecturer Islamic Astronomy Program, Department of Fiqh and Usul, Academy of Islamic Studies, University of Malaya, 50603 Kuala Lumpur,Malaysia. (phone: 037976035; fax:; e-mail: raihanawahab@um.edu.my).

K. Norihan, is Master Degree Candidate, Islamic Astronomy Program, Department of Fiqh and Usul, Academy of Islamic Studies, University of Malaya, 50603 Kuala Lumpur , Malaysia.(e-mail: norihan@siswa.um.edu.my).

M. Muhamad Hazwan, is Master Degree Candidate, Islamic Astronomy Program, Department of Fiqh and Usul, Academy of Islamic Studies, University of Malaya, 50603 Kuala Lumpur , Malaysia.(e-mail: hazwanmustafa89@gmail.com)

Before delving deeper into the scientific methods of obtaining data, an understanding of the concept of the start of fajr prayer according to fiqh perspectives should be emphasized in order to conform to the needs and requirements of the Shari'a. Basically, the concept and theory of the start of fasting and Fajr prayers is mentioned in the Quran and Hadith. It is mentioned in several chapters such as in Surah Al - Baqarah verse 187,Al - Isra verse 78 , Tāha verse 130 and Surah Hud verse 114 as well as in the books of hadith about prayer times.

There are two names for the dawn prayer; Fajr and Subuh. In the Qur'an, it is often mentioned by the name of Fajr prayers while in the hadith it is sometimes referred to as the Fajr prayer and occasionally, the Subuh prayer. The writings by Md Saleh and Mohammed Taqi 'l - Din Al - Hilali Al - Maghribi provide detailed explanations of each verse of the Quran and Hadith mentioned. In the end, the conclusion is based on the most powerful opinion *(rajih)* according to fiqh considerations that the beginning of Fajr prayer time is defined by the *sadiq* dawn that rises in the eastern horizon [5, 14, 15].

Along with the passage of time and developments in the science of astronomy, the theory of the beginning of dawn and fasting has been defined in a more scientific manner. The increase in knowledge in astronomy has raised an awareness on the relationship between the movements of the sun with the fixation of prayer times. Muslim and western scholars in ancient times have conducted research on the movements of the sun and produced a time count of Fajr theory that is more scientific in nature.

The results of their study show that there are 12 criteria of Fajr time elevation angle of the sun that have been identified and used in calculations throughout the world. Among them, Ibn Yunus and Ibn Shatir set the start time of Fajr when the sun is 19 ° below the horizon, Al - Biruni; 18° below the horizon and Al - Marakussi; 20° below the horizon. However, most astronomers agree that the time for Fajr begins when the sun's altitude is 19° to 20° below the horizon [1].

All states in Malaysia use the sun altitude of 20° below the horizon parameter except Kelantan which uses 19°. In theory, trigonometric calculation is used to determine the accurate time of Fajr prayers as follows:

The general formula used to determine the accurate time of the prayer is:

**Accurate Prayer Time=Sun's Istiwa Time+*t***

where, *t*=sun time angle

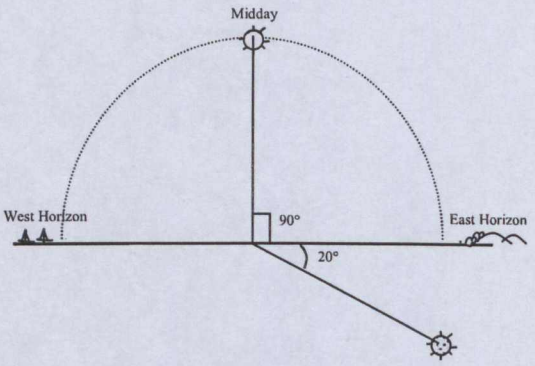
Since the Fajr prayer time sets in before the istiwa sun, therefore the angle of the sun at that time should be deducted from the angle at istiwa time.

The angle of the sun, $t_{fajr}$, is obtained based on the following formula:

$$\cos t_{fajr} = \frac{\cos z_{fajr} - \sin \phi \sin \delta}{\cos \phi \cos \delta}$$

Where,
$Z_{fajr}$ = Fajr time zenith distance
$\delta$ = declination of the sun at dawn
$\varphi$ = latitude of the observer
Zenith distance refers to the angle between zenith and the altitude of the sun when Fajr time that is:
$Z_{fajr} = 90° + 20° = 110°$ as shown in Figure 1 below

FIGURE 1




## IV. ISSUES AND PROBLEMS IN DETERMINING FAJR PRAYER TIMES IN MALAYSIA

With the advancement of science and technology and the invention of sophisticated equipment in the development of astronomy, theories of ancient scholars are reviewed in a more scientific manner pertaining to the changes in the brightness of the sky in determining the earliest onset of *sadiq* dawn as the accurate time for Fajr prayer in Malaysia. Table 1 below shows the results of a study on the brightness of the sky in determining the accurate Fajr time in Malaysia from 2007 until 2014.

TABLE 1

STUDY IN THE BRIGHTNESS OF THE SKY IN DETERMINING ACCURATE FAJR PRAYER TIMES IN MALAYSIA

| Year | Apparatus (Light Sensor) | Sun's Altitude Average Value Findings for Fajr Prayer Time |
|---|---|---|
| *2007* | APC | none |
| *2009* | PMT | 20.3° ± 0.7° |
| *2010* | SQM | 18.8° |
| *2013* | SQM | 18.6° ± 0.6° |
| *2014* | SQM, SQM- L, SQM LR, SQM LE, SQM-LU | 19.1 ° ± 0.1° |

In an initial trial in 2007, studies by Nazhatulshima, Mohd Zambri, Zainol Abidin and Mohd Sahar failed to obtain reliable data inspite of using the APC. Another study was later

conducted by Clarakartini and Abdul Halim in 2009 using the PMT. Subsequent studies conducted by Hardi, Jasni and Abdul Halim and Nur Nafhatun in 2013 and 2010 respectively employed the use of the SQM. It was found that the sun's 20° below the horizon parameter is not significant with the findings of thetheir study. However, in 2014, Shamim and Mohd Zambri made a comparison of the data collected from 2007 to 2011 using various types of SQM. From the study, it was concluded that the values of the sun's altitude obtained correspond to the parameter values currently used in Malaysia. All these studies adopted the comparative study methods, by using different types of light sensors in various places in Malaysia, data on the brightness of the sky is compared to the data obtained from the Department of Islamic Development Malaysia (JAKIM). The results also show no significant differences between the collected data from observation and data from JAKIM.

This study found some issues and problems in previous studies which can be categorised into two aspects, namely, equipment or instrumentation and location or site of study.

*A. Instrumentation of the Research*

Referring to the methodology of the study carried out in previous research, that is the observation method, the choice of instruments used play a very important role. This is because the accuracy of the instruments will affect the accuracy of data obtained and the result of data analysis.

Theoretically, the time of Fajr begins when the sky changes from darkness to morning light. If the phenomenon is plotted on a graph, it would show an upward pattern rising from a horizontal position. For that purpose, the study data should be collected using equipment capable of detecting patterns of light changes.

In their study, Nazhatulshima, Mohd Zambri, Zainol Abidin and Mohd Sahar used the light sensor (APC) and a modified circuit for the first time. However, this study failed and APC is found to be less suitable for use but the circuit may be improved because it can show the expected patterns in graph changes [2].

Through the photometric sky method, a photomultiplier tube (PMT) can be used as a light detector. The sensitivity detectors and ambient temperature make the PMT suitable for use. In a study conducted by Clarakartini and Abdul Halim, the PMT is placed in a photometer equipped with an ultraviolet Johnson filter (U), blue (B), green (V) and red (R). This filter will allow certain light spectrums (according to the colours of the filter) to pass through and other colors are absorbed. At the end of the study, it was found that data that passed through the green filter (V) match the responses of the human eye. Upon analysis, the time of Fajr begins when the sun is below the horizon at 20.3° ± 0.7°; 95 % of the results are in accord with the parameters used in Malaysia [4, 13].

In another study by Hardi, Jasni and Abdul Halim and Nur Nafhatun, the Sky Quality Meter (SQM) and the naked eyes were used as the research instrument by each researcher. The SQM has a reading accuracy of up to ± 0.10 mag / arcsec$^2$. On average, the fajr is detected when the sun is -18.6° ± 0.6° below the horizon. Using the naked eye, the average initial impression of light that could be captured is when the sun is at the position of -16.2° ± 0.5°. It was found by Nur Nafhatun that the average value of the sun's altitude is 18.8° below the horizon and the estimated time for the fajr to take place is between 70 to 80 minutes [3, 4, 10].

*B. Location/Site of Study*

In addition to equipment, location is another factor which influences the observation data. At the selected location, the eastern horizon must be clearly visible and without any barriers in order to obtain accurate and precise data of the sunrise. By obstacles, it means a hill that obstructs sighting along the horizon, interference of light, haze and dense clouds.

Most previous studies on the east coast conducted by Hardi, Jasni and Abdul Halim were carried out at Pantai Merang, Terengganu and Pantai Cahaya Bulan, Kota Bharu. Research was also conducted by Nur Nafhatun at Merang and Kuala Lipis. It appears that all previous researchers performed extensive research into the selected locations to suit the scope and objectives of their research [3, 4, 10].

## V. THE THEORETICAL FRAMEWORK, ISSUES AND PROBLEMS IN DETERMINING ACCURATE DHUHA PRAYER TIME IN MALAYSIA

Based on the methodology of study observed in previous studies, this study finds that the understanding of the concept and theory of the starting time for Dhuha must be identified before getting into more details about methods to obtain scientific data .

There are a few *nas* from the Quran and Hadith that explain the concepts and theories regarding the time of Dhuha. Surah ad-Dhuha verses 1-11, Surah Tāha verse 59 and various hadith give a clear description regarding the sharia' determining of Dhuha time.As- Sayyid Sabiq in his writings explained, numerous dalil, especially those dalil narrated by the Prophet s.a.w., provide explanations relating to the forenoon or Dhuha time.

A previous study opened the path to debates about the conflicts that arose from a hadith/Ahadiths on Dhuha prayer by 'Aisha R.A. In the end, the opinion by Imam an- Nawawi was upheld , who narrated that the Dhuha prayer is an emphasised sunnah which is encouraged to be performed on a regular basis in accordance with Jam'u al - wa al - Taufiq consideratiions in sanctifying the principles in the hadith , especially regarding Dhuha prayer.

Debates on the scheduling of prayer times have also been on-going which is in line with developments of astronomic knowledge among the Muslim community.The awareness on the relationship between the movements of the sun at the local meridian with prayer times has arisen as a result of the propagation of astronomical knowledge.However, the description about Dhuha time is not detailed in comparison to the other prayer times.

According to calculations among astronomers, dhuha begins after the sun had risen to a height equivalent to a spear's length.The time for dhuha has also been divided into two different times that is the lesser dhuha and the greater dhuha.The existence of problems regarding accurate times for dhuha is consequential of dalil which are unclear.

Among the *dalil* for sharia determining of dhuha time is when the sun has risen as high as one spear- length above the horizon and when a young camel's hoofs burn from the heat. Dhuha time is defined as the time when the position of the sun reaches ¼ of the daytime till istiwa.

The definition is later associated with a spear's height. The spear is equivalent to 2 meters up to 2.5 meters or 7 feet from the eyes' view. Is also said to be 12 times the length between the thumb and the index finger in the Maliki School. Other opinions equate the present day measurement of a spear-length to be one meter from the horizon after the sun had risen to the equivalent of 4° 15'.

Prayer times can also be determined by the calculation process, including matters of Dhuha prayers. The calculating differs from a country to another. For example in Malaysia and Singapore the estimated time for dhuha is 28 minutes, in Indonesia the estimated time for dhuha is about 22 minutes, in Brunei Darussalam, the starting time for dhuha is 23 minutes and in Saudi Arabia the accurate time for dhuha is equivalent to 20 minutes after sunrise. In effect, this calculation is made to determine when the sun reaches a certain position or height. This shows the altitude of the sun is also measured in the fixation of dhuha time. The height of the sun during dhuha is approximately within 4°15'.

In Malaysia, JAKIM established the altitude of the sun at the onset of dhuha time to be 4° 42 ' (4.7°). In Indonesia, the altitude of the sun during dhuha time is 3° 30'. Meanwhile, at the Muzakarah Falak 2015 a consensus was reached stating that the position of the sun at dhuha time is 5°. These differences in values have given rise to differences in determining the accurate dhuha times.

With the advancement of science and technology and the advent of modern and sophisticated equipment, the framework of these theories are reviewed by carrying out a more scientific study according to practices in modern astronomy. Two studies have been carried out as the Final Year Project for the Islamic Sharia Astronomy Undergraduate Students at the University of Malaya in 2011 and 2013 through the observation of the shadow cast by the rising sun to measure the height of the sun at dhuha time in order to test the theoretical framework and the existing data.

In 2011, students were found to have failed in obtaining the suitable data due to some technical faults in measuring the length of the shadow during data collection of dhuha time. This study was pursued further by two students in 2013 by first improving the method of data from the study conducted previously. It was found that the height of the sun during the mid-morning or dhuha time differed with the existing theoretical framework.

Based on the methodology of the research conducted in the previous study, problems in determining dhuha accurate times can be categorised into two aspects, namely the choice of instruments or equipment used and the location of the observations.

*A. Equipment for the Research*

The use and selection of equipment or instruments used play a very important role because the accuracy of the instrument will have an impact on the collection of data to be obtained and the results of the study. Theoretically, dhuha time begins when the sun has risen to a certain height after sunrise. Thus, the length of the shadow will be lesser. If this is plotted on a graph, it would show a pattern of decline in length of the shadow. Data need to be taken using an instrument capable of generating shadows and to facilitate the average reading of shadow length easily.

Previous studies conducted in 2013 successfully traced the long shadow but some errors occurred during the data collection. The errors occurred due to inaccuracies of the shadow stick provided. Apart from using the observation of the length of the sun's shadow methodology, another research method to measure the brightness of the sky at dhuha time is by using the Kyoritsu Designer Model 5202 light meter. This instrument is be found to be less suitable for use in conditions of high brightness. However, improvements have been made in this study by using the TES light meter 1332A model. However, the data obtained is not satisfactory due to poor weather conditions.

*B. Location of the Study.*

The location is a factor that may influence the outcome of the observations conducted. The selected location must be a clear eastern horizon where the sunrise could be seen with the naked eye and without any obstacles in order to obtain reliable data. Obstruction may refer to light interference, buildings, the passage of ships, haze and dense clouds. Among the sites chosen by Raudhah and Khairussaadah Wahid in previous studies for the forenoon dhuha time is Pantai Cermin, Tanjung Tuan, Port Dickson, Negeri Sembilan.

In addition, a study by Norihan was conducted at four locations namely Gurun, Pantai Irama, Pantai Batu Burok and the Bukit Batu Academy of Islamic Studies, University of Malaya. A more recent study had also been carried out in the Observatory Selangor Observatory, Sabak Bernam.

This location is chosen because sunlight is received directly without any interference and it is found that the locations have been chosen based on the scopes and objectives of study.

## VI. RESULTS AND DISCUSSION

A study on the issues and problems regarding fajr and dhuha prayer times in Malaysia has identified gaps and implementations for improvements that could be applied when reviewing both of these prayer times in a more systematic and scientific manner to fulfil the obligations of the shariah. The following are suggestions in order to obtain data that is more accurate and precise for analysis:

*A. A Study on Sky Brightness in Determining Accurate Fajr Time*

a) A review of the accurate fajr time needs to be carried out by detecting changes in the brightness of the sky Research of this kind requires detailed observation on the various aspects, factors that affect data collectedn such as the weather and surrounding light. Thus, the angle of incidence of the light detector used as well as the adjustment of the clock to standard

time should be conducted with precision. The incident angle of the light detector is proposed at 20°, 45° and 90° facing the rising sun point. The diversified angle of incidence will allow for the detection of patterns of changes in the brightness of the sky so as to distinguish between *sadiq* dawn and *kazib* dawn which have been a source of confusion in determining accurate Fajr prayer times. Previous studies had focussed more on the brightness of the sky and the altitude of the sun below the horizon for accurate Subuh prayer times thus there was less emphasis on these factors.

b) It is important to choose the most suitable equipment so that there is no error in the data collected. As shown by data obtained so far, the SQM is the most suitable to detect changes in the brightness of the sky. Therefore, this study will use the most-up-to-date SQM that is the SQM - LE for the data collection process in oder to gain data that is precise and accurate.

c) In past research, the studies were limited to one or two specific locations only. It is suggested that future studies would consider more locations across the country in order to gauge the sun below the horizon value which suits the brightness of the sky at *sadiq* dawn in Malaysia.

*B. Review on the Length of Shadows in Determining the Beginning Time for Dhuha in Malaysia.*

a) A review on the start time for Dhuha must be carried out by measuring the length of the shadow to determine the suitable height of the sun parameter to be used in calculating prayer times. As a matter of fact, various factors such as weather conditions, environmental conditions, instruments and adjustments to standard time which may affect the data to be collected must be carefully studied for the purpose of this research. Previous studies on the measurement of the forenoon dhuha time involving the measurement of the length of the shadow and brightness of the sky placed less emphasis on these factors. Therefore, in order to achieve the objectives of this study, this research needs to be conducted again by applying the steps carefully so that the data measurement of the sun's shadow can be obtained more accurately.

b) The choice of precise instruments and equipment such as the shadow rod for measuring the length of the sun's silhouette must be done in order to minimise major errors in data acquisition that may result in unsatisfactory data processing. Hence, it is proposed to use three shadow rods of varying lengths or heights to measure the lengths of the shadows within the time lapse so that the acquisition of data is more accurate and precise. The use of ancillary equipment is suggested such as the light meter to measure brightness and to detect patterns of changes in the brightness of the sky during early Dhuha time. However, what should be emphasized is ensuring the limit measurement value of light sensitivity of the instruments so as not to interfere with the process of data collection.

c) Similarly as in a preliminary study for the Fajr time, previous researchers limited their study to one or two locations only. Therefore, it is suggested that future studies would take into account locations across the country in order to gauge the height of the sun parameter values in determining accurate Dhuha time in Malaysia.

## VII. CONCLUSION

In Islam, for every issue that arises which requires the setting of principles/hukum, a *mushahadah* (testimony) is highly favoured. Similarly, in determining accurate prayer times, the Sharak places importance on *mushahadah* that is the observation with the naked eye rather than on *hisab* (calculation).

Therefore, observations on changes in the brightness of the sky using the naked eyes and equipment to determine the start time of the Fajr prayer and measuring the length of the shadow to determine the start of the forenoon Dhuha must be done in order to comply with the demands of science and the sharia. The study also shows that the development of equipment and modern astronomical science can help solve issues of *fiqh* and sharia.

## VIII. REFERENCES

[1] D. A. King, Islamic Mathematical Astronomy. London: Variorum, 1986.

[2] A. Nazhatulshima et al., "Kajian Kecerahan Langit di Ufuk Senja dan Fajar", Jurnal INSTUN 1, no. 2, 2007, p. 51.

[3] Nur Nafhatun et al., "Background Theory of Twilight in Isha' and Subh Prayer Times," in Dimensi Penyelidikan Astronomi Islam, M. Saadan, M. N. Mohd Saiful Anwar, A. W. Raihana dan A. Z. Nurul Huda, Ed. Kuala Lumpur: Jabatan Fiqh dan Usul, Akademi Pengajian Islam, Universiti Malaya, 2013, p. 121-132.

[4] A. H. Clarakartini dan A. Z. Abdul Halim, "Penentuan Syarat Mula dan Akhir Senja Astronomi Menggunakan Kaedah Fotometri Langit dalam Menentukan Permulaan Waktu Fajar dan Isyak," in Astronomi Pelestarian di Malaysia, M. J, Mohd Zubir, A. Khiruddin, H. S. Lim dan M. S. Nasirun, Ed, Pulau Pinang: Penerbit Universiti Sains Malaysia, 2009, p. 88,

[5] Muhammed Taqi 'l-Dīn al-Hilāli al-Maghribi, Distinguishing the True Dawn from the False Dawn, terj. Kehlan al-Jubury. SunnahOnline.com. Retrieved 14 Julai 2014, from http://sunnahonline.com/library/fiqh-and-sunnah/732-distinguishing-the-true-dawn-from-the-false-dawn

[6] M. S. Hardi, S. Jasni dan A. Z. Abdul Halim, Parameter Kedudukan Matahari Bawah Ufuk Bagi Penentuan Waktu Subuh dan Isyak. e-Falak. Retrieved 3 April 2014, from http://apps.islam.gov.my/efalak/?q=en/artikel-kertas-kerja

[7] Sky Quality Meter – LU. Unihedron. Retrieved 21 August 2015, from http://www.unihedron.com/projects/sqm-lu/

[8] A. Md Saleh, "Penentuan Waktu Solat Menurut Fiqh", in proceeding of the Konvensyen Falak Selangor 2007, Kolej Islam Sultan Alam Shah, Klang, Selangor, 20-21 July 2007.

[9] C. A. Mohamad Saupi dan D. S. Mustafa, "Had Fajar Sadiq dan Syafaq Ahmar (Mega Merah) bagi Kriteria Masuk Waktu Solat Subuh dan Isyak", in proceeding of the Seminar Ke Arah Peningkatan Penyelidikan Falak Di Malaysia, Hotel Seri Malaysia, Pulau Pinang, 27-30 September 1997.

[10] Nur Nafhatun, Sky Brightness at Twilight: Detectors Comparisan Between Human Eye and Electronic Devise For

Isha & Sbh From Islamic and Astronomical Considerations. Unpublished thesis, Kuala Lumpur: Universiti Malaya, 2010.
[11] Noor Hidayah Mohd Zulkifli, Penentuan Waktu Solat Isyak dan Subuh Dalam Kapal Terbang Menggunakan Sky Quality Meter-USB (SQM-LU): Kajian Bagi Carta Perjalanan Kapal Terbang Malaysia Airlines (MAS). Unpublished thesis, Kuala Lumpur: Universiti Malaya, 2013.
[12] Z. Mohd Zambri dan S. Muhammad Shamim, "Perbandingan Metodologi Kajian Penentuan Masuknya Fajar Sadiq dan Hilangnya Syafaq Ahmar : Kajian Kecerahan Langit", in meeting of the Muzakarah Falak 2013, M.S. Garden Hotel, Kuantan, Pahang, 27-29 August 2013.
[13] A. Z. Abdul Halim, "Fotometri untuk Penyelidikan Fenomena Fajar dan Isya", in meeting of the Muzakarah Falak 2013, M.S. Garden Hotel, Kuantan, Pahang, 27-29 August 2013.
[14] Susiknan Azhari, "Awal Waktu Salat Subuh di Dunia Islam", in proceeding of the Panitia Konferensi Internasional Fakultas Syariah & Hukum UIN Alauddin, Makassar, Indonesia, 15 Mei 2013.
[15] Johar, "Implementasi Waktu Shalat Subuh di Negara Brunei Darussalam", in proceeding of the Panitia Konferensi Internasional Fakultas Syariah & Hukum UIN Alauddin, Makassar, Indonesia, 15 Mei 2013.

**A. W. Raihana** is currently Senior Lecturer to the Islamic Astronomy Program at the Department of Fiqh and Usul, Academy of Islamic Studies, University of Malaya, Malaysia. She has completed her Ph.D in al-Quran and al-Hadith in Astronomy at University of Malaya in 2014. She also currently as a Principle Investigator to Research Project "Sky Brightness for Determaining Accurate Fajr Prayer Times in Malaysia". She has taught several courses for the Bachelor of Shariah (Islamic Astronomy) at the Academy of Islamic Studies, University of Malaya such as the Solar System, Astronomy Computing, Practical Observations and, Concept Count Qibla Direction and Time prayer and Faoundation of Physics. Her previous publications include two chapters in the book, 5 articles in local and international journals related to the visibility crescent for Islamic Calendar, eclipse, accurate prayers time and astronomical concepts based on the Quran and Sunnah.
**K. Norihan** is currently Master's Degree Candidate at Department Fiqh and Usul Academy of Islamic Studies, University of Malaya, Malaysia. She has completed her B.A Shariah (Islamic Astronomy) at University of Malaya in 2013. She also currently as a Research Assistant to Research Project "Sky Brightness for Determaining Accurate Fajr Prayer Times in Malaysia".
**M. Muhamad Hazwan** is currently Master's Degree Candidate at Department Fiqh and Usul Academy of Islamic Studies, University of Malaya, Malaysia. He has completed her B.A Shariah (Islamic Astronomy) at University of Malaya in 2013. He also currently as a Lecturer at Academy of Contemporary Islamic Studies, University Teknologi Mara (UiTM), Johore Campus.